

produced from a strikingly coloured original, which is included, that demonstrates the great power that one has in the use of their panchromatic plates. A similar portfolio will be sent post free to anyone interested in the subject who applies for it. The first print is from a negative on an ordinary plate, and shows yellow and yellowish green much too dark, red black, and dark blue very light; and a panchromatic plate, without a light filter, gives the red and yellow, especially the red, too light instead of too dark, and the blues are a little improved. The interposition of a light filter that increases the exposure by only three times darkens the blues, strikingly, though not quite enough. Presumably this is a yellow filter, as it leaves the red and yellow and yellowish-green too light. A green filter would have corrected the reds, as well as the blues, as explained above, and a photograph taken through one would have been a most instructive addition to the portfolio.

CHAPMAN JONES.

NOTES.

OWING to the greatly increased cost of production caused by the conditions of war, it has been found necessary to increase the price of weekly issues of NATURE from 6d. to 9d. The change in price will take place with the issue of October 24. For particulars of the new subscription rates see p. xxxiv.

THE following is a list of the foreign delegates appointed to attend the Inter-Allied Conference on the Future of International Scientific Organisations, which is to be held at Burlington House, Piccadilly, next week:—*Belgium*: M. Lecomte, Prof. Massart, and M. de la Vallée Poussin. *France*: MM. B. Baillaud, G. Bigourdan, A. Haller, Lacroix (permanent secretary, Académie des Sciences), C. Lallemand, Moureu, and E. Picard (permanent secretary, Académie des Sciences). *Italy*: Prof. V. Volterra (Member of the Italian Senate). *Japan*: Prof. Joji Sakurai and M. A. Janakadate. *Portugal*: Prof. B. Freire. *Serbia*: Prof. B. Popovitch and Dr. Zoujovitch. *U.S.A.*: Dr. E. Bumstead, Col. J. J. Carty, Dr. W. J. Durand, Dr. S. Flexner, Prof. G. E. Hale, and Dr. A. A. Noyes. The British delegates are to be nominated during the present week.

THIS year's meeting of the American Association is to take place in Baltimore, Ma., under the auspices of the Johns Hopkins University, from December 27 to 31. Boston had previously been selected as the place of meeting, but as so many men of science are at present working in Washington with matters connected with the war, Baltimore has been chosen to take its place. The activities of the meeting will be mainly directed to the applications of science to the present great struggle.

A WAR Committee of Technical Societies has been formed in the United States of America, with representatives from the following societies and institutes: American Society of Civil Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, American Gas Institute, American Electrochemical Society, Illuminating Engineering Society, Mining and Metallurgical Society of America, American Society of Refrigerating Engineers, and American Institute of Chemical Engineers.

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A MEETING of the Optical Society will be held at the Imperial College of Science and Technology, South Kensington, on Thursday, October 10, at 7 p.m., when the following contributions will be submitted for discussion:—(a) "Sources and Magnitudes of Centring Errors in a Sextant," by Naval Instructor T. Y. Baker; and (b) "Astigmatism: Interchangeability of Stop and Object," T. Chaundy.

At the general meeting of the Institution of Mechanical Engineers, to be held at 6 p.m. on Friday, October 18, the following papers will be read:—"A Law Governing the Resistance to Penetration of Metals which are Capable of Plastic Deformation, and a New Hardness Scale in Fundamental Units," Prof. C. A. Edwards and F. W. Willis; "The Value of the Indentation Method in the Determination of Hardness," R. G. C. Batson; and "The Ludwik Hardness Test," Dr. W. C. Unwin.

THE first general meeting of the National Union of Scientific Workers (for the determination of its constitution and to elect its first representative council) is to be held in London in the last week of the present month. Information as to the time and place of the meeting can be obtained from the secretary, Dr. Norman R. Campbell, North Lodge, Queen's Road, Teddington.

MR. A. E. BERRIMAN, chief engineer to the Daimler Co., has been appointed Deputy Controller of the Technical Department of the Department of Aircraft Production of the Ministry of Munitions, in succession to the late Prof. Bertram Hopkinson.

WE regret to have to announce the death of Dr. Henry Dyer, the former first principal of the Imperial College of Engineering at Tokyo, Japan.

BISHOP MITCHINSON, Master of Pembroke College, Oxford, whose sudden death at the age of eighty-five was announced in the *Times* of September 26, was a warm friend of science and a naturalist of the good old-fashioned kind. In 1855 he passed out of the schools at Oxford with two first classes, one in Lit.Hum., the other in natural science. When he went to Barbados as its bishop he was already well grounded in botany, and his knowledge of the British flora was extensive and precise. In Barbados he found a new plant-world to conquer, and sent many trophies home to enrich our national collection. But it was geology that proved his favourite hobby, and the collection of fossils which he amassed and lately presented to University College, London, contains some very interesting forms. A friend recalls with admiration and delight his courage on one occasion as a collector when, with the assistance of some quarrymen, but without official sanction, he blasted down many tons of cliff at Porth-y-rhaw in search of Paradoxides, hoping that this giant Trilobite might retain some traces of its limbs. Fine specimens rewarded his enterprise, but never a sign of a limb, which sufficiently proves that this big creature did not progress by walking. Bishop Mitchinson was a fellow of the Geological Society, and served on its council. Many of the older members still retain a happy memory of their friendly reunions in the Master's lodge, cheered by the genial hospitality of the most genial of hosts.

THE death is announced of Mr. A. S. Esslemont, late Controller of the Optical Munitions, Glassware, and Potash Production Department of the Ministry of Munitions.

THE death is announced, in his sixty-seventh year, of Dr. Byron D. Halsted, who was professor of botany

at Iowa Agricultural College from 1885 to 1889, and has since that date occupied a similar chair at Rutgers College, New Jersey. At one time Dr. Halsted was managing editor of the *American Agriculturist*. He was president of the Society for the Promotion of Agricultural Science in 1897, and of the Botanical Society of America in 1900.

THE Salters' Company is establishing an institute to be called "The Salters' Institute of Industrial Chemistry," in connection with which there will be two types of fellowships for which post-graduate students of any recognised university will be eligible, viz. fellowships to enable post-graduate students to continue their studies at an approved university or other institution under the general supervision of the director of the institute; and industrial fellowships to enable suitably equipped chemists to carry on research for any particular manufacturer, under an agreement which will be entered into between the institute, the manufacturer, and the fellow. The Salters' Company is open to receive applications for the post of director of the institute from persons possessing exceptional knowledge of scientific and industrial chemistry.

THE Glaziers' Company's luncheon on Wednesday, September 25, to which were invited a number of gentlemen taking a prominent part in the glass industry, was of more than ordinary interest, for the Master, Mr. G. Paget Walford, announced a new policy for the Company. He said that he had determined, when entering on his new term of office, that the Company should assume once more its responsibilities to the industry, and bring its prestige and history and influence to the support of all movements devised to promote the industry's interests. With this object he foreshadowed the formation of a reconstruction committee of the Company and a representative gathering of the trade at an early date. The importance of technical training and research as the foundation on which the industry could be successfully rebuilt was emphasised by the presence and the speeches of the Vice-Chancellor and the senior and junior Pro-Chancellors of the University of Sheffield, and also by Dr. W. E. S. Turner, the head of the department of glass technology, who, in addition, gave some encouraging statistics of the growth of new branches of the glass industry. A letter from Mr. H. A. L. Fisher, Minister of Education, apologising for non-attendance, also strongly urged the claims of technical education and its application to the glass trades.

THE Dodman headland on the Cornish coast has been secured for the National Trust for Places of Historic Interest or Natural Beauty. The donor prefers to remain anonymous.

THE expedition to Barbados and Antigua of a party from the State University of Iowa has returned safely and with good results. The object was not only to secure collections in marine zoology, entomology, and geology from a region in which little work had hitherto been done, but also to study the living forms in and around the islands visited and thus to supplement the future more intensive work based on the collections secured. A number of reports are to be prepared; that on Mollusca by J. B. Henderson, the reef fishes by Dr. B. W. Evermann, and the Asteroidea and Holothuroidea by Prof. W. K. Fisher. The Hydroids and Alcyonaria will probably be dealt with by Prof. C. C. Nutting.

SIR JAMES FRAZER in "The Golden Bough" has collected numerous accounts of the deification of kings and priests. The Sumerian people of the dynasty of Ur (2475-2358 B.C.) developed this phase of religion to

an extent almost unparalleled in the subsequent history of mankind. By them this belief was connected with a fundamental doctrine of ancient civilisation, the conception of a dying god, Tammuz, the soul of vegetation. The *Museum Journal* for September, 1917, lately received, publishes a series of hymns devoted to the cult of Dungi, the first of these men-gods, found in the Nippur Library. This song-service describes the miseries of life and the solicitude of the man-saviour who intercedes to propitiate the wrath of the gods aroused by sin. This new tablet thus occupies a place of peculiar importance in cuneiform literature.

DR. WALTER HOUGH has republished from the Proceedings of the United States National Museum (vol. liv.) an account of the Hopi Indian collections in the museum. This tribe occupies stone-built dwellings in north-eastern Arizona. It was first visited by white men in 1540, and, owing to the isolation of the country, it has preserved to a greater degree than other tribes the arts and customs of the Pueblos. The Hopi live by farming, and the arts in which they are most skilful are weaving, basket-making, and wood-carving, while their proficiency in cookery is widely known among other Indian tribes. The present collections give a vivid picture of their artistic productions and technology. The report is well illustrated by drawings and photographs, and brings together in an interesting way a large amount of information on one of the most remarkable existing Indian tribes.

THE *Brooklyn Museum Quarterly* for July, 1917, only recently received, describes an exhibition of students' work from the various high schools in the city. It consists of models of stage settings, designs, and drawings illustrating the scenic art of the theatre. During the past century the art of scene-painting has held, in the estimation of the public, a position between that of the mural and that of the sign painter, in spite of the fact that during the eighteenth century the art was highly developed in Italy and France. Among the most interesting exhibits are four scenes designed for the recent production of "The Canterbury Pilgrims" at the Metropolitan Opera House in Brooklyn, and those for "Giaconda" and "The Willow Tree." These settings are designed to assist the actor in realising the "atmosphere" of the piece which he is engaged in representing, and to initiate new developments of character. The scheme is interesting, and suggests new developments in art teaching.

MR. J. REID MOIR, in a contribution reprinted from the *East Anglian Daily Times* of September 17, describes an interesting addition to the collections of the Ipswich Museum, which already possesses a fine series of stone weapons. The casts recently purchased are exact copies, both in colour and form, of the most notable discoveries of ancient human bones which have been made both in this country and on the continent of Europe. One cast represents the strange ape-man (*Pithecanthropus erectus*) of Java, others the Heidelberg jaw (*Homo heidelbergensis*), the Pildown skull and jaw (*Eoanthropus dawsoni*), the Galley Hill skull and jaw, two examples of *Homo neanderthalensis*, and the famous Cro Magnon skull and jaw. So far as is known, this is the only collection of the kind in Great Britain, and it deserves the attention of anthropologists.

A CRITICAL survey of what is known of the sense of hearing in fishes appears in the Proceedings of the American Philosophical Society (vol. lvii., No. 2). The author, Prof. G. H. Parker, after a careful study of the literature of the subject, considers it probable that in the ears of the higher fishes, where utriculus

and sacculus are well differentiated, the sacculus has to do with hearing and the utriculus with equilibrium. The sense of hearing is, however, of a very limited kind, amounting to little more than a bare ability to distinguish sound. The ears of the lower fishes are of a more primitive type, and are probably responsive only to relatively loud noises, such as have been shown to be effective stimuli for the skin.

PROF. I. IKEDA and Mr. Y. Ozaki give an interesting account (*Journ. Coll. Sci., Imp. Univ., Tokyo*, vol. xl., art. 6, 1918) of the structure and conjugation of *Boveria labialis*, a new species of ciliate protozoon found living in the respiratory trees of two Japanese Holothurians (sea-cucumbers). Each *Boveria* has a meganucleus and, near its aboral end, one micronucleus. Conjugation occurs periodically, and hence, if this process is taking place at all, the majority of individuals in the same host are in conjugation. The conjugation differs in several remarkable features from the well-known corresponding process in *Paramœcium*. The two conjugants, which are similar (isogamous), become attached to each other by their aboral ends, and the meganucleus does not disappear, but persists throughout and subsequent to the conjugation. The micronucleus of each conjugant undergoes two successive divisions, the first amitotic and the second mitotic; of the four nuclei so produced, three degenerate and disappear, while the fourth divides mitotically into two—a stationary nucleus and a migratory nucleus. The migratory nucleus of one conjugant passes over to and fuses with the stationary nucleus of the other, and the synkaryon so formed in each individual divides twice, giving four nuclei, one of which becomes the new micronucleus, while the other three undergo degenerative changes and become incorporated into the persisting meganucleus, but they can be traced in the first and second fissions of the now separated *Boverias*. The authors record examples with two, three, four, and six meganuclei, but in these cases all the meganuclei except one sooner or later disappear. Encystment of the ciliates in the subepithelial connective tissue of the respiratory trees is also described, but has evidently not been fully traced.

IMPORTANT contributions to the exploration of Labrador by Mr. R. J. Flaherty are described in a paper in the *Geographical Review* for August (vol. vi., No. 2). Mr. Flaherty in 1912 made two crossings of the unknown northern part of the Ungava Peninsula between Hudson Bay and Ungava Bay. The first was eastward by Lake Minto and the Leaf River. Part of this route was traversed by A. P. Low in 1898. The second crossing from east to west was through the unknown heart of the peninsula in about lat. 60° N. Mr. Flaherty followed the Payne and the Povungnituk Rivers, and crossed a barren country almost deserted by the present generation of Eskimo since the herds of caribou moved further south. The only natives encountered on the northern traverse were a small group on the Payne River about thirty miles from the coast. The paper is accompanied by a map of the route surveys on a scale of 1:506,880, and a smaller-scale map of the Ungava Peninsula.

In the Proceedings of the United States National Museum (vol. liv., p. 308, 1918) Prof. T. D. A. Cockerell strengthens his highly interesting determination of the presence of *Glossina* in the Miocene shales of Colorado. Two new species are described, and the author reviews the living forms and their distribution. Osborn's suggestion that many large Cainozoic mammals in America may have been destroyed by fly-borne parasites is rendered highly probable by the wider range of tsetse-flies now indicated by Prof. Cockerell.

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Much importance is justly attached to the insect fauna of the Upper Carboniferous strata of Commentry (Allier), and literature on the scattered specimens appears in various lands. It may be well, then, to direct attention to a criticism by Mr. R. J. Tillyard of two of Mr. H. Botton's descriptions of specimens at Bristol (*Proc. Linn. Soc. N.S.W.*, vol. xliii., 1918, p. 123). Mr. Tillyard contributes comparative observations on recent and Permian species from Australia.

MR. LE ROY JEFFERS (*Scientific American*, August 24, 1918) has explored the Great Onyx Cave, which was discovered about two years ago to the north-east of the Mammoth Cave of Kentucky. The most interesting feature is the great development of gypsum, which produces a rich variety of crystalline growths. We have a suspicion that the word "helectites," used for twisted groups, should be written "helictites," from *ἑλικτός*.

A "GEOLOGICAL Handbook of Northern France" has been prepared by Prof. W. M. Davis for the use of American soldiers in France. The book has been approved by the Geographical Committee of the U.S. National Research Council, and copies are being distributed free to the Army cantonments, etc.

DR. C. FENNER, a graduate of the University of Melbourne, contributed a physiographic paper of unusual interest and importance at the July meeting of the Royal Society of Victoria. The paper deals with the physiography of the whole basin of the Werribee River, which includes the Permo-Carboniferous glacial deposits of the Bacchus March district, known to most geologists. Interesting correlations are made connecting the topographic units of the area with their history and settlement, economic conditions and accessibility, rainfall and water-supply. The rocks of the area include Lower Ordovician sediments, Lower Devonian granitic rocks, Permo-Carboniferous glacial deposits, a mixed Tertiary series comprising older basalts, Tertiary leaf-beds, and newer basalts, while recent alluvium forms the fertile deposits of Bacchus Marsh. The area after peneplanation was subjected to differential uplift in the mid-Tertiary period. After the older basalt was poured out, trough-faulting along east and west lines commenced forming the Ballan "sunk-land," with elevated blocks of the Lerderderg and Brisbane ranges to the north and south. Following the extensive newer basalt outpourings, further faulting, involving a western uplift, formed the Rowsley scarp with a north and south trend; and an east and west fault, with uplift to the north, elevated the Gisborne highlands. Between these elevated blocks the south-eastern part of the area forms the "sunk-land" of the Werribee plains. The relations of the older and newer basalts to the various fault-lines are utilised as elements in establishing the ages of the earlier and later faults. The Werribee River with its tributaries, including the Lerderderg River, are younger than the newer basalts, and their courses were established before the later faulting. As a result of the formation of the Rowsley fault scarp the rivers have developed deep gorges cut into the elevated earth-blocks, the Werribee gorge being in places 600 ft. deep, while the Lerderderg gorge, in a region twice elevated, is in places 1000 ft. in depth.

THE Scientific Proceedings of the Royal Dublin Society for June and August contain communications by Mr. R. G. Allen, of the Royal College of Science, Dublin, on the effect of temperature on the electrical resistances of porcelains, red fibre, and a new insulator known as erinoid—a by-product of milk. The

porcelains were investigated up to 300°C ., and the fibre and erinoid up to 100°C ., the results in most cases being checked by the use of the leakage method, the galvanometer, and the megger. Of the porcelains the Portland china and Royal Worcester were found to be the best insulators. On the insulation of some of the samples change of voltage had no effect. On all the effect of rise of temperature was a large decrease of insulating power, the resistivity R following closely the law, $\log R = a/T + b$, where T is temperature on the Absolute scale, and a , b are constants for each sample. Erinoid is not so hygroscopic as red fibre, and the resistivities of both change with temperature according to the above law.

THE *Journal für Gasbeleuchtung* for May 18 last states that the United States produced in 1917 670,000 hectolitres of "solvenaphtha," i.e. heavy benzol distilling over at between 160° and 180°C ., and from which may be derived 90,000 hectolitres (nearly two million gallons) of toluene by using solvenaphtha in place of oil in water-gas plants. In an industrial trial with the Lowe apparatus, where solvenaphtha was substituted for gas-oil, the production of carburetted gas being 14,000 cubic metres in twenty-four hours, the expenditure of solvenaphtha was two litres per cbm. of gas, the equivalent expenditures of coke and steam being respectively 74 kg. and 60 kg. per 100 cbm. gas, with a temperature of 825°C at the superheater and 15.5°C at the condenser outlet. Light oil, condensed and separated by cooling, represented 57 per cent. of the solvenaphtha employed, and it contained 14.5 per cent. of benzene and 23.7 per cent. of toluene, which corresponds with 8.3 per cent. and 13.6 per cent. of the initial quantity of solvenaphtha.

An account of some interesting studies on the formation of coke, of considerable importance from both the theoretical and practical points of view, is given by G. Charpy and M. Godchot in the *Comptes rendus* of the Paris Academy of Sciences for August 26. Starting with a Brassac coal containing only 11 per cent. of volatile matter and not forming a coherent coke, and a Durham coal with 24 per cent. of volatile matter giving alone a very friable coke, mixtures of these two were carbonised in variable proportions. The crushing strength of the resulting coke varied greatly with the composition of the mixture, first becoming appreciable with 20 per cent. of the Durham coal—24 kg. per sq. cm. with 25 per cent., 45 kg. per sq. cm. with 44 per cent., 80 kg. per sq. cm. with 51 per cent.—and then falling to zero when the proportion of Durham coal was increased by a further 5 per cent. to 56 per cent. This rapid and unexpected variation shows the importance of determining exactly by experiment the best proportion when carbonising mixtures of two coals. The same Brassac coal mixed with pitch in certain proportions also furnished a hard coke, and tar could replace the pitch. Results of high interest were obtained in experiments on the effects of a preliminary heating to a low temperature. With a Durham coal containing 28.1 per cent. of volatile matter, direct carbonisation at 700°C gave a voluminous, soft, friable coke, and this was also the result if the coal had been submitted to a preliminary distillation at 450°C for thirty, sixty, or ninety minutes before raising to 700°C . But if the preliminary distillation at 450°C were carried out for 105, 130, or 150 minutes, further heating at 700°C gave coherent cokes with strengths of 41, 98, and 25 kg. per sq. cm. respectively. Prolonging the preliminary heating to 450°C for a further fifteen minutes (165 in all) gave again a pulverulent coke. Thus this coal, completely useless for coking purposes in its natural state, gives a coke of normal quality if about one-third of its volatile matter is

removed by a preliminary distillation at 450°C . The authors point out that this unexpected result is difficult to reconcile with current theories as to the cause of coke formation.

WE have received a reprint of an article in *De Natuur* by Mr. J. W. Giltay, of Delft, dealing with Mersenne and his ideas on acoustics. Marin Mersenne (1588–1648), Franciscan friar, friend of Descartes, Gassendi, and Thomas Hobbes, "profond philosophe musicien," according to Constantine Huygens, was, in the opinion of Poggendorff (*"Geschichte der Physik,"* p. 327), not a physicist of the first rank, but remarkable for his active correspondence, which at the time replaced to some extent the scientific journals of our day. Mr. Giltay illustrates Mersenne's ideas by quotations from his two principal works, "Harmonie Universelle" (1627) and "Traitez des consonances, des dissonances, des genres, des modes & de la composition" (1635). In spite of the undeveloped state of physical knowledge, the Franciscan sometimes approaches near to our present notions, as in his explanation of beats. At times he is still under the influence of Aristotle, as, when discussing the pendulum and the fall of bodies *in vacuo*, he writes, "l'on ne scait si le vuide est possible, ny s'il est quelque chose de réel." His writings abound in sudden digressions into theology and philosophy, but his interest in music was scientific rather than artistic.

As is generally known, in pre-war times our supplies of glass apparatus for laboratory use were largely obtained from what are at present enemy sources. Now that we are thrown on our own resources, manufacturers in this country have taken steps to meet the demand for such glassware. Measuring instruments, such as burettes, pipettes, flasks, and graduated cylinders, made and calibrated in this country, are obtainable—presumably with no more difficulty than is due just now to questions of priority as regards war requirements. We have recently had an opportunity of inspecting specimens of such laboratory instruments manufactured by Messrs. Gallenkamp and Co., Ltd. A correspondent who has seen them remarks that they are well-made articles, and appear to be quite as suitable for laboratory work as the apparatus formerly obtained. The only suggestion to be made is that the thicker parts of the figures (enclosed between two fine lines) might with advantage be roughened, to make the figures more conspicuous. It may be recalled that, as noted recently in these columns, arrangements have been made by the National Physical Laboratory to test and certify glass measuring instruments sent by manufacturers, so that reliance can be placed on the accuracy of any apparatus thus certified.

In a recent issue of the *Elektrotechnische Zeitschrift* it was stated that the magnetic properties of nickel-steel caused it to be used by the German Navy for the construction of parts of ships near to the compass in order to prevent variable effects on the compass-field. Anschütz and Co. now write a letter (*Elektrot. Ztschr.*, June 20) to state that this use of nickel-steel is by no means new, and, in fact, is a very costly method of obtaining good "compass-fields," and that the method has been almost completely discontinued. The compasses are now almost entirely gyroscopic. The use of this type of compass has the further advantage of saving large quantities of nickel, which is so expensive and difficult to obtain.

THE smallest and lightest practical set of portable testing ammeter, voltmeter, and wattmeter has been constructed by the American General Electric Co. According to the *Electrical Review and Western Electrician* (June 15 last), the ammeter and wattmeter are

equipped for current capacities up to 20 amps. The ammeter is of the iron vane type, the voltmeter and wattmeter being dynamometric instruments. All windings are magnetically shielded and a new type of air-damper is fitted, rendering the needle very dead-beat. The weight of the instrument, complete in case, is less than 2 lb.

A RECENT German patent (*Glückauf*, August 3, 1918) describes a process for rendering powdered coal and charcoal insensitive to moisture. Finely ground and well-dried coal or charcoal powder is mixed with finely divided powdered peat, which, before grinding, is dried artificially at not less than 100° C.

OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF SOLAR PROMINENCES.—A summary of the observations of prominences made at Kodai-kanal during the second half of the year 1917 is given by Mr. Evershed in Bulletin No. 58. The mean daily frequency, mean height, and mean extent along the sun's limb were respectively 20.0, 37.3", and 3.58°, differing but little from the corresponding figures for the first half of the year. There were three principal zones of activity: one about the equator, a mid-latitude zone between $\pm 30^\circ$ and 40° , and a high-latitude zone between $\pm 70^\circ$ and 80° . More than half of the nineteen metallic prominences recorded were observed during December, which was also the most active month magnetically. In observations on the disc of the sun, 239 bright reversals of H_α and eighteen dark reversals of D_3 were noted, and photographs of H_α absorption markings were obtained on 117 days. The areas and numbers of the absorption markings showed a large increase on the previous half-year, indicating an increase in the density of the prominences except in the case of those occurring about latitude 60° , which have seldom given evidence of their presence on the disc. The distribution of the markings showed the usual excess on the eastern side of the central meridian.

Details of the observations of prominences made at Catania during 1916 have recently been published by Prof. A. Riccò (*Mem. Soc. Spett. Ital.*, vol. vii., series 2a). The mean daily number of prominences was 9.8, the mean height 49", and the mean extent of base 3.1° . There was a considerable increase in the frequency as compared with 1915.

PARALLAXES OF HELIUM STARS.—The recent determinations at Greenwich of the proper motions of stars down to 9th magnitude in the zone $+24^\circ$ to $+32^\circ$ have been utilised by Sir F. Dyson and Mr. W. G. Thackeray in an investigation of the parallaxes and intrinsic magnitudes of some of the B (helium) stars (*Monthly Notices, R.A.S.*, vol. lxxviii., p. 651). The region studied is that portion of the galaxy intercepted by the zone between 4h. and 8h. R.A. The stars near 6h. have a large parallactic factor almost wholly in declination, and on the assumption that they have no systematic motion other than that due to the sun's motion, the mean parallaxes of B stars of different magnitudes can be calculated. For 113 stars of types B8 and B9, ranging in mean apparent magnitude from 1.78 to 8.46, the mean proper motions in declination range from 0.1770" to 0.0066", the mean parallaxes from 0.05" to 0.02" and the intrinsic magnitudes (corresponding with the parallax 0.1") from $+0.4$ to -0.5 . The extension of the investigation to faint stars thus confirms the view that stars of types B8 and B9 have not a great range in absolute luminosity. A similar conclusion is derived from the fainter stars of type A0, the mean intrinsic magnitudes having values ranging from $+0.9$ to $+1.5$ for 212 stars of apparent magnitude 5.32 to 8.67.

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STELLAR DISTANCES AND SPECTRAL TYPES.—A paper on "The Mean Distances of Stars of Different Spectral Types," by Mr. Shin Hirayama, appears in the *Annales de l'Observ. Astron. de Tokyo*, appendix 7. The purpose of the author is to test Kapteyn's formulæ connecting a star's parallax with its magnitude, spectral type, and proper motion. He uses 322 stars, for which both measured and spectroscopic parallaxes are available; as the latter are wanting for types A and B, he uses van Rhijn's constants for them. For stars of magnitude 4.8 he finds the mean parallax 0.029" for type M; as the type changes from M through K to G₀ it rises steadily to a maximum of 0.054", and then falls again as we pass through types F and A, being 0.008" for type B₅. His values agree with those of Kapteyn for types B₅ and A₀, but for the remaining types they are about twice as great.

ENTOMOLOGICAL RESEARCH IN AUSTRALIA.

MR. R. J. TILLYARD, whose admirable book on "The Biology of Dragonflies" was recently reviewed in NATURE, has made a further contribution of importance to the study of this order of insects in a series of papers on "The Morphology of the Caudal Gills of the Larvæ of Zygopterid Dragonflies," published in the Proceedings of the Linnean Society of New South Wales (vol. xlii., 1917, parts 1 and 3). Zygopterids are the slender-bodied dragonflies, often distinguished as "demoiselles," the larvæ and nymphs of which are provided with three conspicuous appendages, at the hinder end of the body, traversed by branching air-tubes. A careful comparative study of the structure of these organs in various genera and in successive stages of growth has been made by the author, who concludes that the median dorsal gill-plate in these insects is analogous with the telson in Crustacea, while the paired lateral appendages are cerci, and "therefore the true homologues of the uropods of Crustacea." These latter are compared with the filamentous cerci of the well-known stonefly (Perlidae) larvæ and nymphs, which they resemble in form in the early stages, becoming more highly specialised as growth proceeds. From his comparative studies Mr. Tillyard is convinced that in the evolution of this group of dragonflies a primitive filamentous condition of the larval telson and cerci was succeeded by the "sacoid" type, which persists in a few genera such as *Diphlebia* and *Neosticta*, this by the "triquetro-quadrate" type, found in the *Calopterygineæ*, where the median gill is trapezoidal and the lateral ones are triangular in cross-section, and this by the specialised "lamellar" type characteristic of the larvæ of the great majority of the group, including the familiar *Agrionineæ*. The author promises further studies on the physiology of these interesting structures, for although their function is doubtless respiratory, the aquatic larvæ which possess them continue to breathe in some way when artificially deprived of them.

The remarkable insect-fauna of the Australian region has provided material in other orders for Mr. Tillyard's researches. In Tasmania, New South Wales, and New Zealand he has discovered various species of small scorpion-flies (Mecoptera), which he describes (*Proc. Linn. Soc., N.S.W.*, vol. xlii., part 2, 1917) as representing a new family (*Nannochoristidæ*), with the jaws apparently piercing and suctorial, closely parallel to the condition found in many Diptera, and combining remarkably archaic with specialised characters. In a paper on Permian and Triassic insects from New South Wales (*t.c.*, part 4) Mr. Tillyard describes a closely allied extinct type